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ABSTRACT

This collection of essays focuses on practical applications of technology in public schools; it provides a perspective by teacher practitioners and others on how technology is currently being used or could be used in Connecticut's classrooms for effective schooling. The following papers are included: "Preparing for the Information Age" (Merle W. Harris); "Telecommunications Technology in the Classroom" (Thomas J. Buckley); "Unit Development" (Rita G. Quinn); "The Written Word" (Pamela Skelly); "Don't Be Afraid To Enter the Electronic Schoolhouse" (Modie L. Moore); "The Middle School Computing Room: Lessons from a Learning Resources and Technology Center" (Bonnie Hanna); "Integrating Computers into the Curriculum: A Case Study" (Kristie Y. Foss); "Telecommunications: Your Gateway to the World" (Leigh H. Wajda); "Friendly Advice for the Computer Hesitant" (Cynthia Abate); "SNET Voice Link: Recreating a School Community" (Paul Perrelli); "The Leadership Role: Best of All...It Isn't Teacher-Proof!" (Daniel E. Kinnaman); "Planning for Technological Change" (Eugene A. Lynch); and "Planning and Implementing the Use of Technology in the Windsor Public Schools" (James R. Myers). (JLB)

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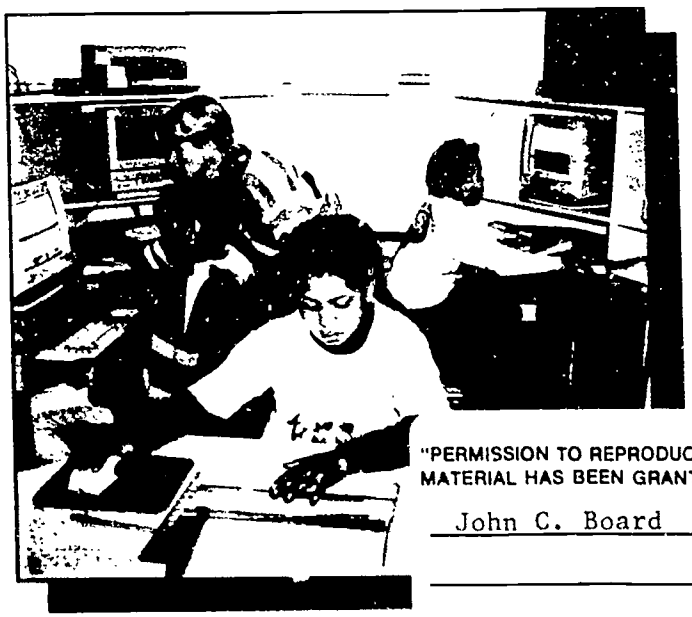
V.

Connecticut Education Association

The Practical Application of Technology in Public Schools



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THE PRACTICAL APPLICATION OF TECHNOLOGY IN PUBLIC SCHOOLS

JANUARY 1994

DEDICATION

THOMAS P. MONDANI

This edition of *Professional Issues in Public Education* is dedicated to Thomas P. Mondani. Over half of Tom's life has been committed to serving teachers through his work for the Connecticut Education Association. Tom joined the CEA staff in 1963 as Research Consultant. Two years later, in 1965, he was named Research Director. In July 1971, Tom was appointed CEA Executive Director, a position he held at the time of his retirement in 1994.

"Vision," Jonathan Swift wrote, "is the art of seeing things invisible." Tom Mondani's tenure with CEA has been a demonstration of turning vision into reality. As a result, the conditions for students, teachers, and public education are better now than in 1963.

Thomas P. Mondani, we salute you!

FOREWORD

It is the practice of the Connecticut Education Association to publish occasional papers on professional issues in public education. This is the fifth such paper. It is a collection of essays in which the writers address the theme: *The Practical Application of Technology in Public Schools.* The writers did not collaborate with each other, and there were no editorial constraints placed upon them except for the maximum length of their essays. The result, therefore, is a distinct perspective by teacher practitioners and others on how technology is currently being used — or could be used — in Connecticut's classrooms for effective schooling.

Connecticut's public schools are ill-equipped to prepare Connecticut's children for the technological world and information age.* The vast majority of Connecticut's public school children are in schools that operate in a learning environment more suitable for conditions that existed in the 1940s or 1950s, prior to calculators, computers, software, interactive television, voice mail, fax machines, satellite dishes, and fiber optic cables. This should not be the case. The current technological readiness of public schools must change rapidly if Connecticut expects to compete and function effectively both nationally and internationally.

The essays in this document illustrate some of the exceptions to what the norm is in most of Connecticut's public schools. The writers of these essays dispel any doubt about the efficacy of upgrading our public schools with the technological equipment and software necessary for instructional purposes. These examples underscore the importance of ensuring that all students have solid experience with technology to meet the challenges of the 21st century.

Editor

* See: Grenzke, Dr. Janet M. *Our Children's Schools: Are They Good Enough? A Report on The Survey of Connecticut Public School Principals.* (Hartford: Connecticut Education Association, April 26, 1993).

Disclaimer: The ideas expressed in this paper are those of the authors and do not necessarily reflect the official policy of the Connecticut Education Association.

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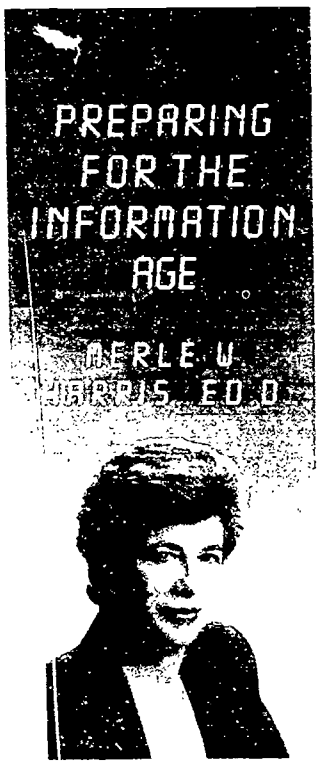


TODAY WE SUFFER FROM INFORMATION OVERLOAD.

Facts, data, statistics surround us. What was accurate information just a few decades ago may no longer be so. Words and phrases that are part of our vocabulary today — CAT scan, AIDS, personal computer, car-phone, birth parent, and Tanzania — were not used 30 years ago. Neither did we concern ourselves with the notion of a global economy. In fact, scientific and other knowledge have increased so rapidly that it is difficult to envision what will be the information of tomorrow.

What are the responsibilities of the schools in today's information age? How can educators make sure that the student of today will be able to cope with the world of tomorrow?

To accomplish this task, today's schools must focus on other than facts, figures, and the accumulation of information. Graduates of our schools must be able to locate information and use it to identify and solve problems. Students must know how to analyze and evaluate data and how to use information to come up with new ideas and new knowledge.

Developing problem-solving skills is not easy, but technology can make that task easier. Computers are being used in classrooms in Connecticut and across the country to do just that. The computer can be used at all grade levels and can enhance learning in many different ways. Some applications are simple and can be accomplished with a freestanding personal computer in a classroom, computer lab, or library. Others require a telephone line and modem to link the classroom, computer lab, or library to the world outside of the school.

The computer also can be tied to sophisticated distance-learning systems. These systems bring the expert into the classroom. Interaction can occur through two-way video and audio connections and can be enhanced with the computer, allowing students to respond individually.

The possibilities for utilizing technology in the classroom may be overwhelming, but there are easy ways to get started. Many teachers are using commercial software to teach concepts. For example, computer software is available for chemistry classes to enable students to learn and explore concepts such as equilibrium or mole relationship. The computer provides visual reinforcement. It also allows students to solve problems in a non-threatening environment. Today's programs go beyond mere drill. The computer even allows for the safe simulation of scientific experiments. A real advantage of many computer-assisted instructional programs is that students move on their own from easier to more difficult problems as soon as they demonstrate mastery.

Software of this nature is available for many grade levels and disciplines, including foreign languages, mathematics, literature, and geography. It just takes discussions with others in the same field or teaching at the same grade level to ferret out the best software to meet teacher and student needs.

As the comfort level with the computer advances, teachers and students can develop their own software. Students learn while preparing material to teach others. Students identify problems and find solutions. This requires software for creating software.

As the level of sophistication increases, the computer can provide access to library and other information systems. The student connects to resources for problem-solving. The teacher becomes the facilitator, helping the student move inside the knowledge web. This use of the computer is a reality in some schools. Classrooms in these schools are linked to Internet or use commercial services such as Prodigy or America Online as the gateway to information. These computer connections help students learn from each other. Students use E-Mail to reach students outside of their classrooms, communities, states, or even nations. As "computer pals," they exchange information in addition to friendly "pen pal" communications.

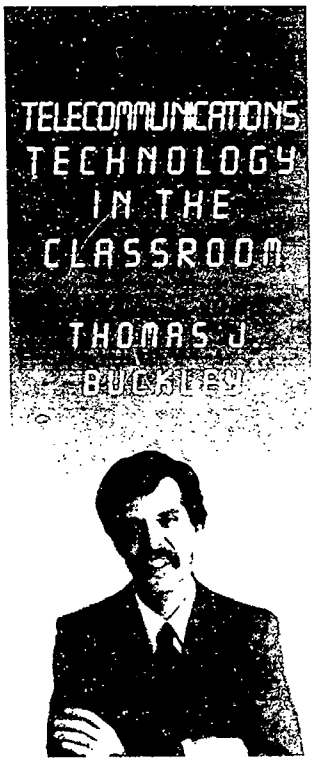
When the computer is used on all the levels just described, the teacher takes on the role of coach and, in this student-centered environment, is no longer the disseminator of information. Indeed, in the world of information overload, the role of teacher as lecturer and disseminator is outdated. The curriculum becomes problem-centered, not content-centered. Students are no longer passive learners but become more responsible for their own learning. The computer also can bring people from different places and backgrounds together. Cooperative learning is encouraged and racial and other isolation are diminished.

Is what I just described a vision or a reality? As chairperson of Connecticut's Joint Committee on Educational Technology (JCET), I know that the computer is being used presently in many schools to ensure that students can function in the information age. The scenarios just described are real.

How can this happen in every classroom in the state? It is up to each teacher to get started, even in a small way. Good starters are the use of word processing with the class or the software packages described earlier. But teachers can not be expected to do it alone. The JCET is charged by the Connecticut General Assembly with planning for the use of educational technology. The JCET and the state have to ensure that everyone has the tools — training, classrooms capable of interconnecting, and equipment — so all students graduating from Connecticut's schools can function in the information age.

This can happen. It is in our hands. The future does not just occur. It is created.

Dr. Merle W. Harris is the Executive Director for State Academic Awards and President of Charter Oak State College. She also serves as the Chair of the Connecticut General Assembly's Joint Committee on Educational Technology. During her 23-year career in education, Dr. Harris taught in Bloomfield and held various positions with the Connecticut Department of Higher Education. She earned her B.S. and M.S. from Central Connecticut State College and her Ed.D. from the University of Massachusetts



STUDENTS FROM SCHOOLS THROUGHOUT CONNECTICUT ARE USING TELECOMMUNICATIONS TECHNOLOGY TO "TALK" WITH STUDENTS IN OTHER COUNTRIES.

Others, by using electronic research bases, are researching subjects that cannot be adequately explored in the school's library. Still others are taking courses being taught from another school through interactive video teleconferencing. All of these schools, sharing the desire to improve the educational process, have found that technology can help them accomplish that challenge.

As manager of the SNET Links to Learning Program, I have had the opportunity to work directly with classroom educators in over 150 schools as they accepted this challenge. Each of them faced the same tasks of introducing new technology into their classroom—learning a new skill, developing it into a useful classroom tool, and then taking the final step of integrating it into their own teaching day. This article will review some of the applications that were developed by your colleagues throughout the state.

The following examples represent some of the applications developed for the use of data telecommunications. Simply put, these projects use a computer attached to a telephone line through a modem in order to access remote resources. These resources include other people, reference materials, and project activities shared across telephone lines. Before reviewing any of the project descriptions, I feel it is important that you realize that most of the involved educators in the following projects were novice computer users who had never used telecommunications before this effort. All received support from SNET through the SNET Links to Learning Program in the form of financial assistance, educator training, and technical support.

Electronic Mail

Electronic Mail (E-Mail)—Students are now able to communicate with students in other locations electronically, much the same way that pen pals communicate using the U.S. mail service. However, the link between the students provides instantaneous communication and provides an easy way to integrate computer skills being taught to today's students. Schools in Connecticut have developed "key pals" throughout the world as they learn about other countries and cultures and share efforts through projects arranged by classroom teachers. A few examples of these follow.

Senior Citizen Links—Two elementary schools—Academy Elementary in Madison and Hall Memorial School in Willington—both established electronic connections between senior citizens and elementary school students. In Madison, students exchanged personal information and also learned about the depression (the one in 1929, not the current one!) from the seniors. Willington students were matched with seniors and shared personal experiences, which were made into a scrapbook at year's end. Both of the projects included a year-end get together where seniors and students met face to face.

Urban/Rural Connections—How can you expose students to different cultures when your school is located in a rural part of the state? Both New Hartford and Voluntown schools used E-Mail to develop links with Hartford and Bridgeport schools, respectively. Schools defined programs which culminated in field trips to one another's locations. The New Hartford - Hartford link was enhanced by using a still-picture telephone which allowed students to see one another as the project progressed.

Foreign Pen Pal Connections—Imagine that you are a high school German-language teacher. You have established an electronic mail connection with a school in Germany for the year, and your students are able to "talk" directly with the German students. Each, of course, is expected to communicate in the foreign language. Your students, therefore, must now write in German to peers in that country. As the semester progresses, the political situation in Germany

changes and the Berlin Wall is demolished. Your students have been following the whole situation using their electronic correspondence and learning firsthand from students of similar age about this earth-changing event. Norwalk High School's German students had this opportunity.

In another case, East Lyme High School established an electronic link with its sister school in France in order to better prepare French-language students for a planned trip to that country.

Electronic Research Databases

Electronic Research Databases—Public schools strive to maintain a current and complete set of reference materials for their students. However, today's information explosion makes this task nearly impossible. Electronic libraries now provide immediate access to a full range of current magazines, newspapers, journals, and other reference sources. Many of these contain full text which can be electronically accessed and downloaded (copied to) your personal computer, where students can use it on word processors. Keyword searching allows students to search the entire text of material as they select only the information which is relevant to their topic. Many Connecticut schools now provide access to these services as a supplement to current library holdings; such access is used when the school's own resources cannot satisfy a student's research needs.

Structured Online Services

Structured Online Services—This term applies to online activities which have been structured to meet a specific curriculum need, topic, or subject area. The sponsoring agency provides weekly activities, defined schedules, and specific instruction or computer programs which enable the inexperienced teacher to participate easily in the program. In some cases, these services are provided by commercial vendors such as National Geographic; others have been developed by colleges or other classroom teachers.

National Geographic KidsNet—Many elementary schools use the National Geographic's KidsNet activities to enhance math and science curriculums. Through a series of hands-on telecommunication-directed activities, kids from around the world perform basic scientific studies of their local areas and share that information through a telecommunications link. A science "advisor" is available online as a resource for students as they perform their research. As part of the program, the students can also E-Mail messages to students in other schools who are enrolled in the same program.

Project ICONS—Windsor High social studies students had the opportunity to learn firsthand about country negotiations through a simulation activity coordinated through the University of Connecticut. The activity, known as Project ICONS, simulated the world's political environment and required the students to assume the role of a foreign country, facing situations from that country's viewpoint and interests. Other schools which had assumed other identities also participated, and weekly online "world conferences" become the forum for lively discussion and debate as the different countries negotiated.

Summary

It is not possible to cite all the exciting projects which were developed using telecommunications as part of the SNET Links to Learning program in this article. Since 1988, 150 Connecticut public schools have participated directly in this program. Each of the involved teachers developed exciting and interesting projects which were established as a means of enhancing classroom instruction. In closing, I would like to offer some suggestions to those of you interested in implementing similar efforts with your students.

First, I would suggest that you start with a simple project which fits into your curriculum. For instance, you could establish an electronic

mail connection with a neighboring school and develop a research project which is of interest to both sets of students. Another way to begin is to subscribe to an already defined classroom project such as National Geographic KidsNet activities for grades 4-7. The service supplies all of the classroom materials needed to complete a math/science related activity, provides detailed instructions which allow beginners to participate easily, and has well-defined goals, objectives, and schedules.

Second, get some support through a training class or from local educator "experts" who have previously used telecommunications. It is also important that you devote some time to using the technology before beginning classroom projects. You do not have to become an expert user, but should acquire some basic skills before including students. Many schools are now including telecommunications overviews as part of inservice training, which offers an excellent opportunity to develop basic skills in this area.

Finally, it is important that you recognize that YOU, as a classroom teacher, can indeed make a difference. Meeting the challenges of providing the best education to your students is not an easy task. However, technology can enable you to introduce some new and exciting possibilities to your classes.

The next step is yours.

(Specific information about the programs described above can be obtained by contacting the author.)

Thomas J. Buckley is Manager of Education Relations for SNET and the 1993 CEA Friend of Education Award recipient. Buckley received his A.S. in Computer Science from Williamsport Area Community College in Pennsylvania, his B.S. from Fairleigh Dickinson University in New Jersey, and his M.B.A. from the University of New Haven.

YOU ALL HAVE HEARD THE REASONS WHY YOU SHOULD BE INCORPORATING TODAY'S TECHNOLOGY INTO YOUR CURRICULUM.

There should be no doubt in your mind that we have already stepped over the threshold from the Industrial Age into the Information Age. Just as the technologies of the Industrial Revolution changed the 20th century world, including educational institutions, technology continues to cause dramatic change in our world. It is no longer debatable whether our students *need* to use modern technology in the schools. Computers are a fact of life, a marvelous tool for us to use in our daily routine. What students (and teachers) need is access to these tools and the opportunities to incorporate them into their everyday lessons. In addition to using the computer in daily affairs, students need to learn to use technology to locate and, more importantly, manage information. It is no longer what we know but whether can we find what we need to know that is crucial to success. Access to information will be what divides people into the have and have-nots of the 21st century. We live in an age where we can easily overdose on knowledge and yet be starved for wisdom, where our daily newspaper contains more information than our founding fathers had access to in a lifetime.

Can this be overwhelming? Yes! Can it be invigorating? Yes! Can it be ignored? No!

So where do you start in your classroom? My suggestion is to utilize the part of your curriculum that excites you most! This is the area where you have the most confidence, are most receptive to additions, and are least threatened by change. Software programs that augment most subject areas abound. The challenge is to choose quality. Most companies allow previews in educational institutions. Another source for input is your local Connecticut Educators Computer Association (CECA) members. They will be more than willing to assist you with software selection. And don't be afraid to experiment.

I will share two programs that I like especially because they lend themselves so easily to cross-disciplinary units. As you will soon discover, technology transcends formal subject lines and naturally integrates learning.

Cross Country USA allows students to become truck drivers responsible for picking up various commodities in the United States. Used as directed, it is a marvelous way to learn U.S. geography, enhance map-reading skills, and practice problem-solving in a game format. But what else can it accomplish? Teachers can plan what the student truckers need to load and can therefore guide the geography component. The program also tracks how the student truckers accomplished their mission: how much each spent on gas, food, motels, tickets, repairs; how long the trip took; and how many miles were clocked. What a perfect opportunity to graph the results and compare and contrast the findings by categories. And if you or someone in your building knows about spreadsheets, you can use the computers for the graphing exercise and produce a variety of charts. So what started as a simple software exercise in U.S. geography has expanded to a unit that integrates social studies and math while keeping all students actively learning. The technology provided the backbone of the lessons, but the skill of the teacher managed the activity. This is what is now termed transparent technology.

Another program that I've had great fun with over a number of years is Factory. Every time I use it, I find more ways to integrate the program into existing curriculums. The stated objective is to have students replicate a computer-produced product by programming the punch, stripe, and rotating machines in a sequenced assembly line. Much easier said than done! The program has built-in difficulty levels and the flexibility to allow students to challenge each other. Using the program out of the package is fun and productive, but there are many ways to use its power.

How about setting up simple factories in the classroom to produce sandwiches? Food is always such a motivator! What is the most effi-

cient way to organize "the factory"? Have the students experiment with a variety of set-ups, including completing each step individually, progressing to an assembly-line operation. Soon they will offer their own observations of the advantages and disadvantages of factory work.

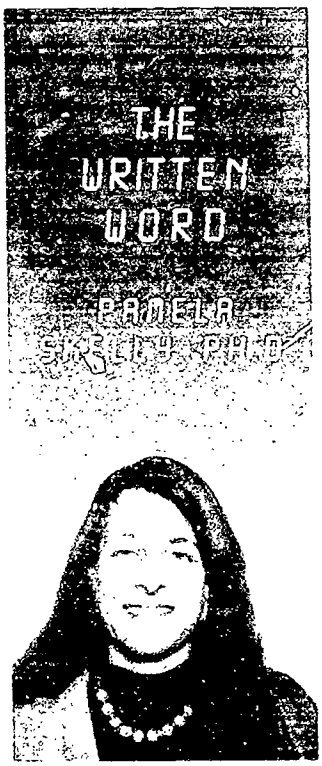
When using the computer program, make your classroom into a factory where workers are rewarded according to quality production. Organize the factory with a foreman, quality-control person, etc. Experiment with how the work is assigned, with worker benefits, etc. Then evaluate the different situations. Sometimes I have a Factory-Build Off where groups of workers compete to be the first to set up their computer factory to produce a particular widget.

Now is the perfect time to visit a local factory. The students will participate in such a trip with an heightened awareness gained first hand. The unit could then incorporate a writing project — worker interviews and/or a local history lesson. Use the experiences to launch a unit on the Industrial Revolution or labor unions or the problems facing us today with NAFTA such as cheap labor in other countries and robot operated factories. The abundance of topics is unlimited!

With technology, you and your students have the opportunity to simulate and experience situations which make lessons personal and relevant. Not only have you explored the world of work and social issues with Factory, but you have reinforced mathematical concepts of shape rotation. Again, a simple software program can springboard as far as time and imagination will allow. The software program transparently creates an opportunity for students to learn actively in an environment that makes natural connections of the various content curriculums.

To be successful, begin with just one unit. Locate a program that allows you the flexibility to manage the lessons. Look for ways to extend and expand. And, most importantly, have fun and share your findings!

Rita G. Quinn is a computer teacher for the Plainville Public Schools. Quinn has taught for 15 years. She earned a B.S. from Northern Arizona University, and an M.S. from Fairfield University. She is currently pursuing her sixth year degree at Bank Street College in New York City.



WHEN THERE IS A PURPOSE FOR LEARNING, UNDERSTANDING IS DEEPER.

Although you may be hesitant to use a computer, a worthwhile reason could motivate you to do so. Word processing is probably the easiest computer application for an educator to learn, simply because it's so practical. Writing worksheets, sending letters, composing curriculum, and communicating personally are among the tasks we do each day. A word processor makes it easier to edit work and to create better-looking documents.

The Word Processor

The convenience of using a computer and a word processor greatly increases your ability to create, edit, store, and print written work. The stream of text you create and modify is saved as a file or document. Files are stores on a floppy disk or hard disk. Later, these files can be retrieved, opened, or loaded, all terms which mean to take the file from storage on a disk and bring it into the electronic form for editing. The terminology for computer systems and software programs may differ slightly, but most have similar features.

Project ideas for the classroom are endless. Handouts for a unit can be edited and modified as curriculum is updated. Lists of books and references can be appended and annotated. Tests and their answer keys can be easily created. For letters, field trip forms, or memos, the word processor file is a backup for the printed paper. Rewriting of curriculum or a scope-and-sequence can be saved under various names to follow the work in progress. Overhead transparencies can even be produced on some printers.

Learning about how a word processor works can be done in many ways. Find a combination which will be best for you. A human instructor — a professional presenter in a workshop, a college instructor, or a family member — could give you a start. Or you can teach yourself: use the tutorial which frequently accompanies the software, read the manual, or start up the software and begin a project. You will undoubtedly find a concise chart of frequently used features and information on how to access them quickly in the software manual. Also, many books have been written for popular programs. The software will usually have a help section that can be accessed for information while the program is being used.

Novice computer users frequently have difficulty grasping the concept that what is seen on the screen is not necessarily what the document will look like. Some software programs offer "WYSIWYG" (What You See Is What You Get), but the fact that one moves through text with cursors and pointers frequently makes a user a bit uncomfortable. Fears of losing text as it scrolls out of view, along with the horror of needing your children's help, will dissipate once you understand how computers handle text.

The software designer has created an "interface" through which you control the computer's processing of your text. Each interface is a bit different, but they all do essentially the same tasks. Every word processor has a feature for saving, editing, and printing work. The secret to the power of word processing is to learn the methods for using the wide variety of features. Word processors all have menus that can be accessed by the keyboard or mouse to modify text, check spelling, replace a word, move a block of text, and much more. These applications will also use special command keys and combinations as short cuts.

Essentially, the computer handles documents in a code of zeros and ones. The binary code for text is ASCII (American Standard Code for Information Interchange). For instance, "A" has an ASCII number of 65, which is 01000001 in binary notation. Then "B" follows with 66, or in computer language, 01000010. And so on for the remainder of the alphabet, numbers, and special symbols. You'll probably even find an appendix of the ASCII chart in your software manual, so, if you are curious, you can find out

what the rest of the alphabet is to computers. The word-processing file also contains codes on margins, text changes, and a variety of other information. Although this might seem like a terribly cumbersome method of writing, the computer doesn't write. The computer processes the numbers which represent your text quickly and accurately; that is what computers do best - compute.

You will only improve your computer skills if you give yourself projects and do them. Treat your mistakes as learning opportunities, but keep frequent backup files and printouts to be safe. Always remember to save and to save frequently. The general rule is every 10-15 minutes, or when you have written something you never wish to write again. If the material is truly important, save it on a backup disk.

Printed Words

The quality of printed documents will be determined mostly by your printer, although your computer system and software programs may be factors. Printers can vary in quality. Some may produce a light array of dots, while others may print materials that look as if they had been published professionally.

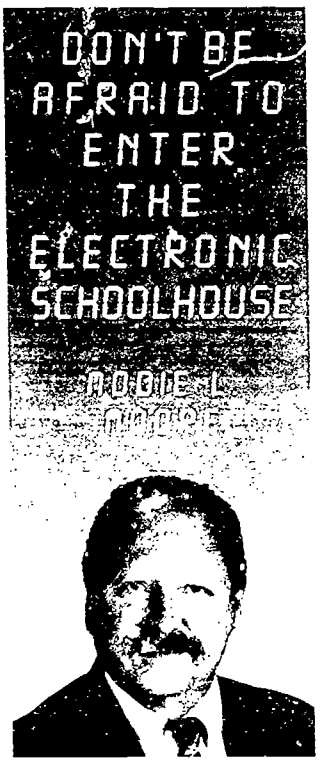
Typographic and design rules vary, depending on what the printer can produce and on the purpose of a document. The proper method of spacing on monospaced type dictates two spaces after the end of your sentence. Monospaced type is similar to a typewriter in that each character has the same width. If you are using a dot matrix printer that prints all letters the same width, use this rule. The other category, proportional type, has letters which vary in their width. The typographer's rule is one space at the end of the sentence if you are using proportional type, common to laser printers, some dot matrix printers, and other printers, such as ink-jet.

If your computer system is sophisticated enough, take advantage of changing the font, its size, and its style. Don't overdo the mixing of fonts and styles or choosing a difficult-to-read font for body text. Many excellent references on design and desktop publishing can be found in most bookstores.

Final Words

Take the initiative now and decide on a worthwhile computer project. Gather all your resources and begin to learn.

Pamela Skelly is the Computer Coordinator and teacher at Parish Hill High School for Regional District #11 in Chaplin. She has taught for 15 years. Skelly holds a B.S., M.S., and Ph.D. from the University of Connecticut.



IF A TEACHER FROM 1950 CAME INTO YOUR CLASSROOM. WHAT DIFFERENCES IN THE ROOM WOULD HE OR SHE SEE?

My elementary school provided a bottle of ink and a fountain pen (which always leaked). The major electronic item was a light bulb. Today's children live in a rapidly changing technological world, yet many of our classrooms are little different from those of decades ago.

Isolation remains a problem. Each day we face limitations of the four walls surrounding us. Imagine a power that allows you and your students to extend learning beyond the classroom without ever having to leave that room. I would like to share how I have used the computer as a tool that empowers students to interact with others around the world. The key is telecommunications.

Telecommunications involves connecting a computer through phone lines with another computer. A modem translates anything created on your computer so it can be sent over a phone line and exchanged with another computer also connected by modem and phone. Usually you are calling an electronic bulletin board (BBS) to make this connection. This powerful and exciting tool enhances teaching and learning in any classroom. It has practical applications to any curriculum. And it can be set up and used by any teacher even though that teacher may not be a computer expert.

Don't be scared off. Last year I discovered America Online (AOL), a vast telecommunications service that allows hundreds of thousands of users to communicate easily. Make a local call with your computer to a special long-distance service such as Telenet to access AOL and enter a vast, electronic community. Offerings include CNN, *Time* magazine, stocks, airline reservations, encyclopedias, weather, and news. Everything is accessed from a helpful menu with the familiar, friendly Macintosh look.

Although an initial look at any online service might seem daunting, I easily found the Electronic Schoolhouse, a creation designed specifically to link teachers and students. One meets full-time teachers from around the country who want to share ideas. Many develop class projects which your classes may join. You also find a group of educators with technical expertise who share one bond — a desire to use telecommunications as a powerful learning tool for their students.

For my first project I joined Scrapbook USA, now in its fifth year, coordinated by a full-time teacher from Connecticut. It linked me to over 20 public and private schools from California to Maine in an interdisciplinary writing workshop. Students in grades 3 to 12 wrote "Hello" letters that described their communities and their schools, as well as their own personalities. After the first letter, classes began developing a dialogue through the computer. We wrote questions and responded back and forth. We met a larger audience with whom to share our writing. We learned more about each other. One of my seventh graders struck up a friendship with a third-grade class in California, a personal correspondence he maintained throughout the year.

During a period of seven weeks while we participated in electronic dialogues, my class wrote personal narratives as part of the curriculum. Students in other schools worked on poems, essays, and stories that grew from their curriculum. Later, all published their work electronically. With enthusiasm we read a variety of prose and poetry, responded personally, and in turn received comments. All classes selected favorites and shared their reasons. Everyone wrote and received positive feedback.

Our grand finale took place in the "chat room," an electronic meeting place that allowed everyone to type in real time and see responses on our computer screen. For this last day of the project, kids arrived by modem from around the country for the final "party." I did not know what to expect. We came in costume, using words to create disguises that provided clues to

our identity. We used knowledge gained from the "Hello" letters to help us guess each participant's school.

Today all writing has been stored in an electronic library containing contributions from students in over 125 schools. One can find a wealth of material here for teaching writing.

While exploring other areas of the Schoolhouse, I discovered a wide variety of projects developed by teachers. A woman in Hawaii coordinated an environmental study which culminated with students from many different states creating a newsletter that could be accessed by anyone. A father and son traveling around the world sent narrative descriptions of cities; using these clues, classes tried to discover "Where in the World are Joe and Arlo?" Other teachers developed "Westward Ho," a simulation of the pioneers' journey to Oregon. Students in schools from other places formed wagons and learned about the joys and tribulations of life during their electronic trip West.

I met many other teachers who also were just learning to use telecommunications. They were having as much fun as their students. I began talking with a community of teachers enthusiastic about involving classes in learning that extended beyond the walls of their room. For example, I have been trying to learn ways to develop an effective reading workshop. I posted a message asking what others were doing. Soon an exciting dialogue developed as teachers began sharing approaches, asking questions, and collaborating. I started a "Book Chat" area so my class could share favorite books with others around the country.

To join in, you will need a Macintosh or IBM compatible computer, a modem (under $100), and a phone line. For an AOL kit which provides 10 hours of connect time, call 1-800-827-6364 Put the disk in your computer, type INSTALL, and you are ready to make the first connection. When you first log on, AOL asks you to select a screen name to use so others can find you. Mine is MODIEM. Hold down the <Apple> key and press <K> at the same time. A box will ask where you want to go. Type ESH, press <Return>, and explore the Electronic Schoolhouse.

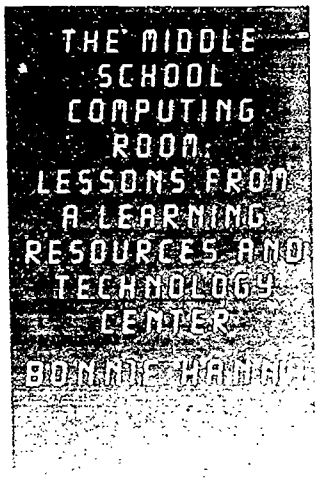
To become a subscriber will cost about $10 a month for five hours of connect time. Additional hours cost $3.50 per hour. (One can do a lot with a class in five hours.) We wrote and saved most text before calling. A "flash mail" feature allowed us to call in, send mail, and retrieve messages to be answered off-line. One computer in the class became a gateway to others around the country. During the day, students worked independently or in cooperative groups on the projects.

The biggest problem is getting a phone line into your room. DAVIDT93, an on-line friend, noted, "Every teacher I turn on to telecommunications ends up against that same wall — they can get a computer and a modem, but the administrator won't let them tie up a school line for an hour or so every day. Why, I don't know." The recent CEA survey of Connecticut public schools noted that telephones "common in even the smallest business environments" do not exist in the classroom. Yet many teachers are finding ways to get their classes online. The principal in my school supported my effort by having a wire run to the class from a building extension. It cost under $10 for the wire and a phone jack. If the line is not busy, we can dial out with the modem — it is a local call, no cost — and meet with others on America Online.

Don't be afraid of technology. Telecommunications fits smoothly into an existing curriculum. It is one of the easiest, most effective uses of technology to enhance learning in a classroom. Earlier I mentioned you could meet people around the world. As you become comfortable with AOL, you will discover it also provides a link to the Internet, a collection of university, library, museum, and governmental computer networks that connect an estimated 20,000,000 users in 137 countries. Classroom possibilities are endless.

Jump in now. In my school, two other teachers with no telecommunications experience who have plugged into AOL attest to its simplicity. Open the world to your classes.

Modie L. Moore is president of the Connecticut Educators Computer Association and an English teacher in the Middlebrook Middle School in Wilton. Moore has taught for 29 years. He has a B.A. from Yale University, an M.A. from Columbia University, and an M.S. from Iona College in New Rochelle, New York.



ILLUSTRATE A TYPICAL DAY IN YOUR LIFE WITH GRAPHS....

Gather, enter, and explore current data concerning the Middle East....Access and print current information about your favorite endangered animal.....Visualize angles by drawing geometric shapes....Write (with ease and skill) about any subject....Communicate with different countries, perhaps Australia....Plan and budget for your summer vacation....Explore the history of trade through a comparison of economic data....Make simple machines work....Design, draft, and produce your own machine part....Compose and play your own musical work.... .

Such activities are routine for students and teachers in one of Connecticut's middle schools. Computers have become an everyday tool for learning. But accomplishing this took time.

A visit to Ledyard Middle School this fall revived memories of 1985, when I became the newly hired district-wide Computer-Education Consultant, and 450 or so seventh and eighth graders with 25 teachers joined me in embarking on an educational journey. The students have since graduated from high school, but now, nine years later, many of the same teachers say, "Hello, good morning....Are you with us today?...I have a quick question about printing....When are we going to get some more computers?...Let's do something different this year in social studies....When can we meet?...Have you seen the schedule?...I need more time for my classes in the computing room." I hurry down the hall toward the computing room, remembering.

By the fall of 1985, eighteen Apple IIe computers had been installed in the library media center, software had been purchased, a computer-literacy curriculum had been written, a schedule had been designed, and we were to begin computer-literacy classes. The schedule also provided for computer use by individual students during daily activity periods and after school. Many of the teachers had attended workshops to familiarize themselves with computers in general, and several had purchased their own computer for home use.

We were eager learners. I say "we," as Ledyard had decided to implement the computer-literacy program in a rather unique way. Classes from the major subject areas—English, social studies, math, and science—were each to come four times to the media center to learn about computers. Teachers came, too. Thus the formal computer-literacy sessions took place. A major goal was to learn about computers and how particular software could be used to support each subject area. The four-lesson sessions were planned collaboratively by the computer-education consultant and the subject-area teacher.

The sessions improved each year. Teacher participation increased in direct relation to positive experience; some of the consultant's activities choices were enriched by teachers' knowledge; available computer time was quickly "grabbed" for follow-up activities; teachers were planning ahead to what they were going to use the computers for the next year; and topics chosen by the subject area teacher became more related to current curriculum. We were starting to use the computers as tools: word processing for English, database for social studies, spreadsheets for math and science, and Logo for math.

Three years later, in the fall of 1988, we began to update our technology by purchasing eight Macintosh + computers, networked printing, and a variety of software. In addition, we moved to an area connected to the library media center that offered less interruption for both library and computing facilities. This room became the Ledyard Middle School Computing Room. For the next three years a mixture of Apple IIe, IIgs, and Macintosh tools provided learners with an opportunity to explore different ways to do their work. The once-a-week schedule, however, made it difficult to maintain interest and continuity on the part of students and teachers. After much discussion, times were rearranged to one full week per grade level subject, with the option of follow-up days during

the remaining times. Most teachers enjoyed the chance to spend five full, consecutive days in the computing room with their students. Many teachers began exploring the unique possibilities of the Macintosh. Graphing, closely followed by drawing, became a particular favorite of the middle school math teachers. As newer technology was purchased, the subject-area teachers requested that the IIe and IIgs computers be moved to their domain in order to provide daily computing time for students. Computers and software were allocated to technology education and music. In the meantime, the special education areas had acquired IIe, IIgs, and then Macintosh technology to support those skills being taught in the computing room.

By the fall of 1992, the computing room was totally "Mac-ified." The primary tools continued to be word processing for English teachers and graphing and drawing for math teachers. Social studies and science teachers began to explore spreadsheets and graphing tools. At this point an interesting phenomenon occurred. Although some teachers were still planning and implementing their computing time in coordination with the computer-education consultant, many were now ready to become independent. With the occasional help of the librarian, library aides, or the computer-education consultant, these teachers were able to implement the entire week or more of computing time with their students. Their independence was infectious. By the fall of 1993 most of the teachers at Ledyard Middle School were able to plan and implement their student computing time. This is not the end of the story, though. This story has just begun, as evidenced by the teachers' questions mentioned before. The excitement is growing; the success is contagious. We plan to keep going.

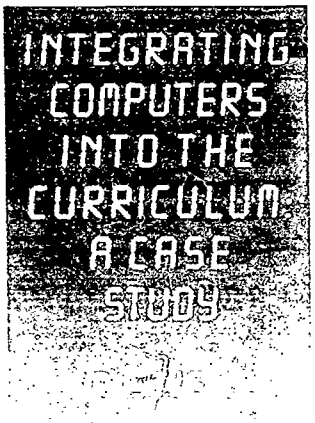
We consider the following as keys to our success so far:

❑ First, joint planning - building level and district wide. A curriculum committee was charged with integrating learning resources and technology throughout all curricula. A resource acquisition and allocation plan used as a basis for annual budget action was devised. Building level requests for specific application of technology were submitted. Both teachers and administrators participated in the planning.

❑ Second, making sure that learning resources and technology are used to achieve curriculum goals. Teachers, with the aid of the computer-education consultant, have been leading the way as they and their students discover how these tools can help them learn. We envision a time when the tools will permit student involvement in the process of active curriculum development for increasingly authentic learning experiences.

❑ Finally, time for a program to evolve. The students change. The technology changes. Even the teachers change, although many of the faces have been familiar throughout the process. Time provides the opportunity for all participants to both react to and then become part of the change process.

Bonnie Hanna is the Computer-Education Consultant for the Ledyard Public Schools and a Visiting Faculty member at Connecticut College. Hanna has taught for 17 years. She earned her B.A. from the New England Conservatory in Boston, Massachusetts, her M.A. from Johnson and Wales University in Providence, Rhode Island, and her C.A.G.S. from Southern Connecticut State University.



COMPUTERS HAVE BEEN IN SCHOOLS FOR SEVERAL YEARS.

Ideally, computers and related technologies would be incorporated into the regular school day and used in a variety of ways to accomplish certain tasks. Too often, the regular classroom teacher is either overwhelmed by the possibilities or completely in the dark. Last year, in one of our fourth grade classrooms in Montville, Connecticut, a teacher decided to integrate technology into a new theme-centered curriculum. The story follows.

The school system had recently developed a model social studies curriculum. This thematically-based program formed the core to which other curriculum areas could be tied. The teacher sought the assistance of the computer coordinator, and they devised a plan of integration.

The fourth-grade social studies curriculum begins with a theme of families and the community, expands to a study of Connecticut, and then compares regions of the United States with our own. Since students needed to become familiar with the computer keyboard and develop introductory keyboarding skills, we began with a computer keyboarding program, Communikeys. Students practiced beginning skills using the classroom computer, and, occasionally, the computers in the school's small computer lab. To maximize typing practice and incorporate other subjects, learners practiced writing their weekly spelling words on the computer rather than on paper.

The "kick off" project came as students began to explore the local community. A field trip to the local supermarket, Beit Bros., was arranged. Mr. Nathan Beit gave a tour of the store, stressing the school-related skills needed in various jobs. Students interviewed his staff and took notes on various aspects of the store. Pictures were taken with a regular camera and also with a Canon Xapshot camera.

Back in the classroom, the Xapshot camera was plugged into a TV monitor and the students viewed pictures of their trip. As individual store workers were shown with their interviewers, the student interviewers stood and reported orally on what they had learned. Later, all students engaged in a writing project and sent thank-you letters.

Photos taken with the regular camera were developed in duplicate. Students created a bulletin board featuring a large poster containing all the pictures, for which they had written captions. The poster went to the store, where it was on display for several weeks.

In the meantime, the computer coordinator used Computer Eyes to transfer the pictures from the Xapshot camera into the Macintosh computer. The teacher, coordinator, and students then designed a framework for an interactive HyperCard stack. The result was a "tour" of the grocery store. From a central map, the computer-user selects a section of the store. A screen about that section appears, containing text written by the students and a picture from the Xapshot camera. Students also used the microphone on the Macintosh LC to record additional information about the store and the people they interviewed, so that the pages "talk." Later in the year, the students and teacher presented their HyperCard stack at the statewide annual PTA Conference. They were proud of their accomplishment, and the conference attendees were impressed!

Now that the students had seen a real store, they wanted to set up their own classroom store. Much math was needed to determine counter space and to fix prices. The math coordinator taught a lesson in which students designed boxes to hold specified materials. When the store was finally functional, students used The Little Shopper's Kit from Tom Snyder to turn their computer into a cash register.

At mid-year, the class participated in a National Geographic KidsNet unit called "What Are We Eating?" This unit tied in perfectly with the store visit and the nutrition section in the regular curriculum. It also gave the students an opportunity to learn more about other regions

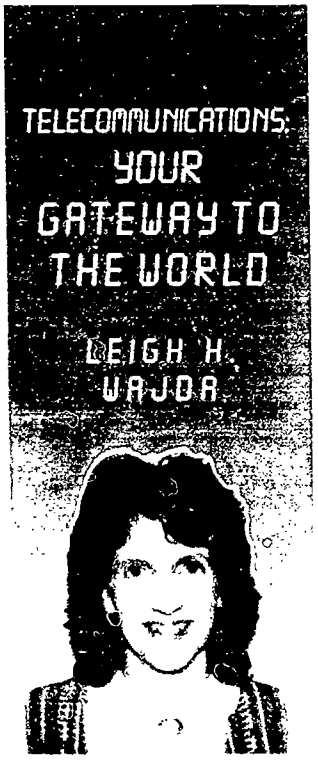
around the country — part of the social studies curriculum!

As part of a SNET telecommunications grant, the class used a voice mail system to increase school-home communications. Each day, the class reviewed the day and summarized upcoming events. Children took turns recording the daily message. Parents called from home to learn about what had happened in school.

Near the end of the school year, the students and teacher invited Mr. Beit to visit their classroom. They demonstrated the various activities that had grown out of their visit to his store and explained how they used technology in their lessons. Mr. Beit was very impressed. He told the students he felt they had a real understanding of how school work and the work world relate. He also told them that if any of them wanted part-time work in his store when they reached work age, they should apply and mention that they were in Mrs. Aarnio's fourth-grade class!

The program was so successful that we will be repeating the process with all the fourth grades at Mohegan Elementary School this year. What a difference integrating the curriculum and technology has made for our students!

Kristie Y. Foss is a 22-year teacher and Coordinator of Computer Education and Technology for the Montville Public Schools. She is also an adjunct faculty member at Eastern Connecticut State University. Foss received her B.S. from the University of the Pacific in Stockton, California, and her M.A. from the University of Connecticut. She also earned a C.A.G.S. from the University of Connecticut and a C.A.G.S. from Southern Connecticut State University.



IMAGINE SEARCHING YALE UNIVERSITY'S LIBRARY OR THE LIBRARY AT THE UNIVERSITY OF BERLIN, GERMANY.

Imagine having a conversation with someone in Russia during the latest attempted coup by the hard-line Communists. Imagine having students from Kansas to Oregon or Alaska critique the essays of your students here in Connecticut...or, even better, imagine having them work collaboratively on a publication of American folklore collected from small towns across the U.S. Imagine having students in several locations collect information on acid rain and compare the data in their science classes...or, having your students debate a world issue with students from another country. Imagine wanting to teach a lesson on Native-American bartering systems and going directly to Native Americans for resources (or perhaps even prewritten lesson plans). Imagine sharing and planning lessons with teachers from across the continent (or world) as a way of expanding your teaching. Or imagine attending your next Math Committee meeting with examples of what is being done in a dozen or more districts throughout America. Imagine doing all of this without leaving your building, and yet receiving the information within hours of the asking.

Imagine to your heart's content, but get ready for reality. Thousands of students and teachers are already doing just such exciting things daily through the medium of telecommunications. (And doing it more cheaply and more efficiently than ever before.)

For ten years it has been our dream to connect our small suburban/rural district to somewhere else in the world to see what others are doing and thinking. We started small, with limited goals. We wanted to connect our two elementary schools, so that children at one end of town would realize there were children at the other end, also, before both groups collided unexpectedly in the combined middle school on the first traumatic day of fifth grade. Because of other priorities, lack of expertise on our part, and lack of a good, easy way to make this connection happen, our very limited dream was put on the back burner. But about a year and a half ago things began to fall into place, and our dream of connecting two schools in one town suddenly became a dream of connecting two schools on opposite sides of the world. And in the course of pursuing our dream, we accidentally stumbled upon a wealth of other resources available through the incredible world of telecommunications.

We bought an inexpensive modem, connected it to our Apple 11GS, and ran a piece of telephone wire up one wall, across a hallway, down another wall and into an existing phone jack. We had heard of an elusive network called Internet, but had some trouble finding out just how to get connected to it. (Internet, we discovered, was really a huge world-wide telecommunications network linking thousands of smaller networks.) Commercial networks seemed too expensive, and we were also limited by an extremely restricted telephone free-dialing area. All of the access numbers were in the Hartford exchange. A parent kept telling us if we went to our friendly local university and got an account, we could talk to anyone in the world for free. Now "free" is the best word we know, but we also know that nothing is ever absolutely free, and we found that the universities weren't as friendly as we needed them to be.

In the meantime, we spent some money on the National Geographic Hello Unit and later on the Acid Rain Unit as we continued our pursuit of the elusive Internet. We finally found one local university friendlier than the others, and we managed to convince persons there that we were worth a "guest" account on their mainframe. The best part was that calls were not toll calls. This was our gateway to the world. Faster than you can say "Boris Yeltsin," we had what we wanted (or thought we wanted). It took time to figure out how, but we were finally able to talk to almost anyone in the world about almost anything. (Anybody, that is, connected to Internet, and by all recent accounts, that *is* almost everybody.)

And what do we do with this thing in real life? Most important, we communicate with our friends in Moscow. In 1990, a letter to Russia averaged two to four weeks travel time, if one were lucky enough to get the letter past the censors. A fax was good but expensive. Letters sent over the Internet, however, were received in minutes, and apparently slide past censors. On a recent visit to Russia, our students were able to send their impressions back to us instantaneously. We faxed these letters to our local newspaper. They published, and we faxed the articles back to Russia in a turnaround time of 48 hours. Truly amazing!

There are also several special-interest groups on Internet which deal with education and children. These groups are called LISTSERVs. One that we access is KIDSPHERE. Hundreds of educators from around the world use KIDSPHERE everyday. Last fall, a school in Virginia held a literary contest over several weeks. Our entire fifth grade was able to participate. Each morning, three clues were posted on the Internet by students in Virginia. We downloaded the clues and announced them to our students during homeroom. If we could identify the book from which the clues were taken, we uploaded our guess to the students in Virginia to see if we were correct. About 20 schools participated.

A group of students from the Midwest posted a notice asking for local folklore tales. High school students from other locations were invited to submit tales of local lore for publication. The publication was available via Internet for the asking.

Another LISTSERV we just recently discovered is KIDCAFE. This is reserved only for students; adults are restricted from this area. Students from around the world carry on "key pal" correspondence through KIDCAFE.

ASKERIC is another Internet offering which is extremely beneficial for educators. When one of our teachers needed information to write a paper for a graduate school course, we accessed ASKERIC. This researches ERIC files for the user electronically. The user also has the ability to do searches independently. This same teacher was able to send her professor a note when she needed to contact him even though his office hours and her planning period did not match.

Internet is just one way we connect to the outside world with our computer. America Online (AOL) is a commercial network, specifically geared toward education. Rates are reasonable: $9.95 per month for five hours of free access time. (Introduce a friend and get 10 free hours.) We are now able to take advantage of the toll-free access number in Hartford, an extremely user-friendly system, icon-based and chock full of information. We have access to the news, weather, and sports (updated almost instantaneously), to technology information, to shopping at the Waldenbooks Store, to jokes and games, and to online discussion groups (both for adults and students). AOL also allows access to Internet.

What else can telecommunications do for you? There are information services galore, including CompuServe, Prodigy, Dialog, and a host of others, each with different offerings and specialties. (Prodigy is updating its service to include activities and information especially designed for use by early elementary students.) The National Education Association Bulletin Board is also online and accessible through AOL. High school students can now apply to college online. Write to your congressperson (Sam Gejdenson, BOZRAH@HR.HOUSE.GOV; Chris Dodd, SENDODD@DODD.SENATE.GOV). Write the President.

Imagine away. This is only the beginning. It's not possible to visit the four corners of the world everyday, but through telecommunications it is becoming easier to bring the entire world to our classrooms. Think globally: the world is available. Act locally: get your students connected. Just do it! You'll be glad you did. (*For more information, please contact Leigh Wadja at Coventry Public Schools, 1776 Main Street, Coventry, CT 06238 or EMAIL: DZICEK@ECSUC.CTSTATEU.EDU.*)

Leigh H. Wajda is a special education teacher and Computer Coordinator for the Coventry Public Schools. She is a 16-year veteran teacher. Wajda holds a B.S. from Springfield College in Springfield, Massachusetts, and an M.S. and C.A.G.S. from the University of Connecticut.

"I'M A COMPUTER VIRGIN!...

You know, we English teachers and humanities people are not technical....I'd love to try the computer, but I just haven't got the time....I feel so stupid; the kids know more than I do!....I'm so afraid I'll break something....I had a nightmare last night about taking this computer course!...."

Are comments like these familiar?

Are you a technology observer, modest practitioner, or aficionado?

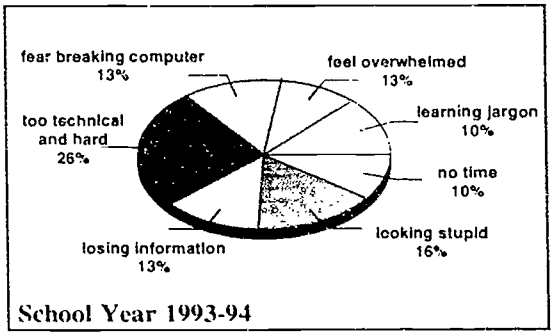
Are you acquainted with successful, productive people who are too overwhelmed by the mystique of jargon and keyboard commands to take the plunge, and start their first computer class?

This article is dedicated to those who have hesitated to learn technology in an era of soaring skills inundating the learning curve. For 12 years, I have observed and studied the use of technology in both education and business; for the last 10, I have conducted training sessions to help teachers, administrators, business staff, retirees, and students overcome their fears and champion its uses.

When asked to write this paper, I decided to question colleagues by using "A Survey To Help Hesitant Folks Get Started Learning Computers." At the time I gave them the questionnaire, all had completed some training on the computer. They were asked to recall their personal anxiety and pre-user perspective prior to their initial encounter with a computer. They agreed to complete the survey, but frowns of frustration appeared as they remembered their pre-computer anxiety.

The survey questions and the responses follow. Comments on the responses and suggestions for computer-hesitants follow each set of responses.

Question #1. ***What concerns or fears were your greatest barriers in starting to learn about computers?***



School Year 1993-94

Responses:

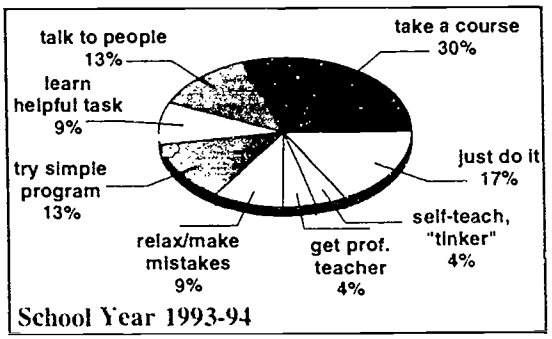
26% - I am not a technical person; computers are too difficult to learn.
16% - I do not want to look stupid.
13% - I feel overwhelmed; there's too much to learn.
13% - I am afraid I may lose information.
13% - I am afraid I may break the equipment.
10% - Too much jargon.
10% - Not enough time.

Respondents to this question, who have developed a strong computer-knowledge base, agreed that it is not necessary to be "technically inclined." As for "looking stupid," any program's ease-of-use and efficiency are stressed as leading corporations vie for evaluators' benchmark awards and the responding, lucrative customer base. Also, one soon learns computers do not break easily, and that work can be saved on additional disks as "back-up" copies to avoid loss. Focusing on one program and growing comfortable with its jargon will augment one's confidence and productivity.

No one "looks stupid" learning about computers. Shouldn't we, as educators, model lifelong learning? Consider boosting your students' self-esteem by requesting their assistance when you encounter a roadblock on the screen, asking them for a demonstration, or viewing samples of their printed work. Some may astonish you, while others, you may find, articu-

late well, although possessing only a superficial knowledge base.

Question #2. ***What is the best advice you have for a person who wants to get started learning about technology?***

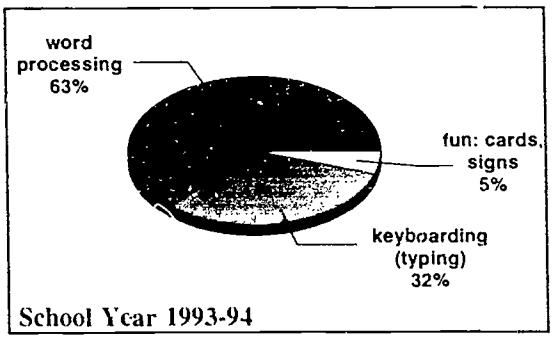


Responses:

30% - Take a course.
17% - Just do it; jump in with both feet.
13% - Talk to knowledgeable, supportive people.
9% - Learn to do a helpful task that will make your work more effective.
9% - Relax; make many mistakes.
4% - Get a professional teacher.
4% - Teach yourself, "tinker," and solve your own problems.

All survey participants promulgated hands-on training in an adult education course, at a computer-training facility, privately with a colleague or a student, or solo sessions for those who prefer reading manuals and calling software telephone-support numbers. Also encouraged was pursuing computer users who reputedly relish conversing about technology and trouble-shooting problems. Regional resources can be found by attending user-group meetings announced in newspapers. Many of these clubs publish newsletters and hold regular meetings in a face-to-face, supportive network. Using a modem connected to a telephone line allows one to access popular, online services such as Prodigy, America Online, or CompuServe, all of which have Help forums, groups, or SIGs (Special Interest Groups), offering support throughout daytime and late evening hours for most types of computers. All questions are honorable when learning a new program.

Question #3. ***With what type of skill did you begin learning computers?***



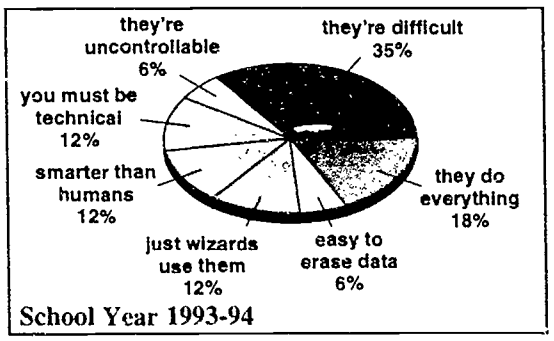
Responses:

63% - Word processing
32% - Keyboarding
5% - Fun (cards, signs, banners)

Word processing is the electronic, pragmatic writer's tool, evolved from the typewriter, that "memorizes" your work (saving or storing it on a disk). Pictures, graphs, and charts can embellish your text. Not surprisingly, word processing is the leading choice of applications suggested for beginners by the survey participants. Industry giants are now producing the same word-processing programs for Macintosh and IBM/compatible computers, such as Microsoft Word and Works, WordPerfect by WordPerfect Corporation, and AmiPro by Lotus Corporation, to name a few. Keyboarding skill to "touch type" on a computer is a recognized asset, but not a requirement. The faster one enters information by typing on a computer keyboard, the easier it is to focus on thought processes, rather than on the laborious search for the next key. However, the 'hunt-and-peck' method is used daily by thousands of successful computer operators. Some technologically old, but popular, fun programs that probably helped more school users get started are "Printshop" and "Printmaster." These generate simple, personalized banners, signs, calendars, and greeting

cards seen in school corridors and classrooms.

Question #4. ***What is one myth about computers that helps to create the overwhelming "awe" about them?***



Responses:

35% - Computers are difficult. (You just need patience.)
18% - Computers can do everything.
12% - You must be technical to operate them.
12% - Just computer "wizards" use them. (If kids can learn, why can't professionals?)
12% - Computers are smarter than humans.
6% - It is easy to erase data. (You get warning messages.)
6% - Computers are uncontrollable.

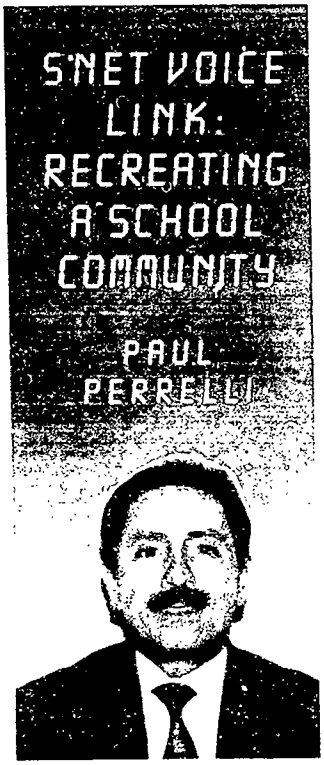
Remember, that any computer program is authored by humans, and a program is as limited or powerful as its designers allowed. Today's better programs coach the user with suggestions on what to do next on the screen, known as "prompts." This coaching helps one to progress or to correct errors in a "forgiving" manner. Most software programs have "Help" options to access; some have tutorials, self-paced, built-in programs to explain how to operate the program's features. Others have telephone-based, technical-support lines, either free or with fees. Programs, such as Norton Utilities, are designed to retrieve "lost" data. Keep in mind, that what appears to be lost, may be but a few, reviving keystrokes away. Ultimately, the longer a program is used, the more confidence a person will acquire.

The computer humbles us all. In my most torrid moments, I say it develops character; most assuredly, in moments of victory, confidence soars ecstatically. In my primordial computer course — word processing on a Wang minicomputer, I was the matriarch of the class. Most participants were high school students, and my confidence plummeted. Truthfully, the jargon kept me behind the pack from the first lesson. In my second pursuit of skills, an "introductory" seven-week summer institute at a university, I learned, to my dismay, that one-half of the 165 participants owned a computer! The person who helped me most with technical support later became my husband, and has continued to be my mentor.

If given a chance, technology tends to bring good people together and augments the platform for people needing each other. John Naisbett calls it "high tech, high touch," and says it develops the mind by offering practical, limitless opportunities.

If ever were heard some encouraging words in the survey, they are simply to "Jump in with both feet....and just do it!"

Cynthia A. Abate is a Middle School Computer Facilitator, teacher trainer, computer applications teacher for grades 6-8 in the Newtown Middle School, and past President of the Connecticut Educators Computer Association. She has taught for 24 years and received her B.S. and M.S. from Central Connecticut State University.



EVERY AFTERNOON, TELEPHONES IN HAND, TEACHERS AT OVERBROOK ELEMENTARY SCHOOL DIAL THEIR TOLL-FREE NUMBERS TO ENTER SNET VOICE LINK AND MAINTAIN DAILY CONTACT WITH PARENTS AND COMMUNITY MEMBERS.

Teachers are able to leave brief messages for parents or students and they, in turn, are able to leave private messages for the teacher or principal. Any person who has a touch-tone phone, the toll-free number, and the individual mailbox number may call free of charge from anywhere in Connecticut to listen to the message of the day.

During the past year, the first of a two-year grant from the Southern New England Telephone Company (SNET), the use of an electronic voicemail system has created stronger ties with parents, students, and colleagues. SNET Voice Link has been one component of Overbrook's use of technology to improve the overall educational climate at school. As one parent noted, "Keeping up to date with your message service, which by the way is the Greatest of Ideas (parent emphasis), has been a new and positive experience." This remark has not been uncommon.

I can recall the day our staff was introduced to the voicemail system one year ago. The idea of using an electronic system to create, send, or erase messages seemed to be so overwhelming. After our "dry run," we were instructed to install greetings onto our mailboxes that evening.

The following day two of seven teachers were confident about their attempts the previous evening. A brief instruction sheet was created for the remaining staff members to use in order to find their way through the system. Within days, SNET Voice Link was in use. After parents and students were informed of the system, it did not take long before all parties involved were comfortable with it.

It was helpful to understand the system in a visual way in order to use it. Teachers who initially had difficulty using it had to step back for a moment to picture what was happening when they wanted to use the system. Once this step was understood, teachers were able to go to the next step, which was to use the system following the prompts. A person cannot make a major mistake using SNET Voice Link. Any errors that are made can be corrected with the touch of a button.

I have found that working with a staff member new to the voice system takes about one-half hour to acquaint the person with the basics of the system. New staff members were confident and thrilled to have access to such an effective tool. One new staff member cited, "I was impressed with how quickly one can get accustomed to the system. Parents who were already familiar with SNET Voice Link were excited for me to begin using it."

The teachers on staff who have used SNET Voice Link for the past year have become so familiar with the system that they have used it in ways they had never anticipated. One busy staff member who sometimes thinks of a great idea to use in class during the evening or on weekends would call her mailbox to leave a reminder to herself for future reference.

Teachers frequently leave messages to their colleagues, for either private or group distribution; this can be effective and time saving. Anyone in an administrative capacity would find this to be exceptionally helpful as well.

When teachers call their mailboxes to listen to their private messages, they may hear messages from their students. One student, last year, upon arriving home from school, excitedly called her teacher to say that she had won first prize in a poetry contest she had entered. Students call to say hello and to let their teacher know they are doing their homework. Parents call to keep informed of their child's day and to let teachers know that they have called, or they may call to ask a question of a teacher. We, in turn, have

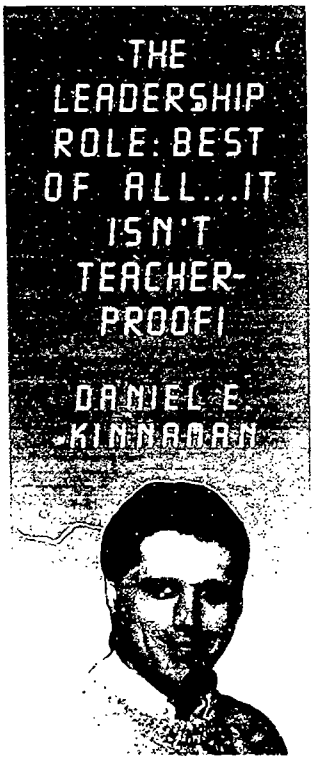
been accustomed to checking our mailboxes at least twice a day so that we might respond to parents or colleagues who have called.

I have included some important elements and helpful suggestions our staff has found to be effective in leaving messages for parents.

- ❑ Identify the day and date of the message.
- ❑ Begin and end on a positive note.
- ❑ List homework and reminders for long-term assignments.
- ❑ Make suggestions to parents to reinforce learning at home.
- ❑ Inform parents of learning resources available outside of school.
- ❑ Pose a question for thought to parents or students.
- ❑ Invite callbacks for the next message.
- ❑ Identify when the next message will be sent.
- ❑ Invite responses to your message.
- ❑ A 60-90 second message is optimal.

SNET Voice Link has had a significant impact on our school. It has brought our community much closer together. This technology has been easy to learn and fun for everyone to use. Most importantly, many of our faculty, parents, and students agree that SNET Voice Link has changed the way we communicate with each other. We now do so in a more positive and productive manner.

Paul Perrelli teaches fifth grade at Overbrook Elementary School in East Haven. Perrelli has taught for 23 years. He earned his B.A. from Iona College in New Rochelle, New York, and his M.S. and C.A.G.S. from Southern Connecticut State University.



I'D TAKE GOOD TEACHERS OVER GOOD TECHNOLOGY ANY DAY—IF WE HAD TO CHOOSE, THAT IS. FORTUNATELY, WE DON'T.

We can and should have both, but I raise the point because, even though the tide seems to be turning, far too much effort still goes into trying to make technology *teacher-proof*. That's pure folly and wherever it's happening, it should be abandoned completely. Its end result is to replace teachers with teaching machines. Such a notion is a serious impediment to school reform, because even in its best-case scenario, it severely undermines both the value of teachers and the value of technology.

Teachers and technology both have vitally important, but different, roles to play in education. Computers and related technologies are just tools. True, they represent the greatest information and communication resources ever created. And true, no human being can compete with a computer when it comes to storing, retrieving, presenting, or transmitting information, but technology is still just a collection of tools. Of course, if teaching consisted only of dispensing information, then these tools could replace teachers. But teaching comprises far more. For example, central to high-quality teaching are at least two qualities that technology cannot provide.

The Art of Teaching

Technology possesses no inherent philosophy of education, nor can it independently or directly participate in the *art of teaching*. These will forever be the domain of human beings, and it is this non-quantifiable human element of the transaction between teacher and student, not technology, that ultimately determines the quality of a student's education experience.

In his landmark book, *How to Solve It*, written well before the advent of the personal computer, G. Polya writes about the relationship between teacher and student. He describes the art of teaching as knowing just when to step in with a question or suggestion, and when to back off and let a student wrestle with a new concept or process. It is an art that cannot be reduced to a formula.

According to Polya, the successful teacher doesn't just help a student toward the answer to a problem. The good teacher must do more. The good teacher must also succeed in helping the student learn how to form the questions and how to pose the problems that lead to answers.

Good teachers also have a special ability for recognizing and taking advantage of the *teachable moment*. They understand the delicate balance between stimulating and agitating, between probing and providing, between observing and directing. In addition, expert teachers know and appreciate the value of their own qualitative assessment of the learning situation and they are able to integrate it seamlessly into their teaching. Perhaps most important, though, the best teachers are able to cultivate in their students a hunger for both academic and intellectual independence.

Even if equipped with no resources other than their individual creativity and brilliance, good teachers will be able to reach some students. But with such wonderfully useful assistants as today's technology resources, it is reasonable to expect that every student can excel. Together, good teachers and good technology, provide a solid one-two punch for substantial and lasting education improvement.

You're Not Just the Manager of Instruction

This view of teaching and technology is very different from what I encountered on a recent visit to a technology-rich elementary school. The school serves as a reference site for a large technology company, and our tour was led by one of the company's enthusiastic sales reps.

In one classroom we saw several students working at a cluster of computers. Noting that the teacher was not directly involved in the ac-

tivity, the sales rep quickly pointed out that one of the primary benefits of technology in education is that it changes the teacher's role from *delivering instruction* to *managing instruction*. To illustrate what she meant she referred to a student working on a writing program. "This program teaches the writing process," she said. "Right now, it's requiring the student to enter a title before it will let her write her story."

Now that bothered me. Not the fact that the teacher wasn't present (often good teaching means leaving students to work independently), but that starting with a title is a required part of the writing process. Most bothersome, though, was that there was no element of the learning environment that seemed to encourage students to question the validity of that requirement, or to make an inquiry about any other aspect of the learning task. So I decided to ask the teacher how technology was affecting her role in the classroom.

"I'm the manager of instruction now," came the reply.

"But what do you do?" I asked.

"Basically, I make sure all of the students have the disks they need, and if they have any trouble with the software, I help them out."

After a lengthy conversation it became clear to both of us that she really didn't believe that her role was simply to *manage instruction*. Clearly the school could hire someone far less qualified than she was to do that.

So how did she come to adopt the *manager of instruction* role? Apparently the excitement of acquiring such a powerful collection of education resources had caused her prematurely to buy in to the notion that the technology did the teaching and her job was somehow to *facilitate* the process. I'm happy to report that our discussion, which grew to involve a number of other educators and vendor reps, ended with all of us in agreement that it should indeed be the other way around. Technology exists to serve teachers, not to replace them.

This article first appeared in *Technology & Learning, May/June 1993*. It is reprinted with the editor's permission.

Daniel E. Kinnaman serves as the Education Technology Coordinator for the Windham Public Schools, and he is an award-winning columnist, feature writer, and news editor for Technology & Learning *magazine. He also consults and speaks nationally on education technology issues. Mr. Kinnaman has 14 years of experience in public education and is completing his Ph.D. in education at the University of Connecticut.*

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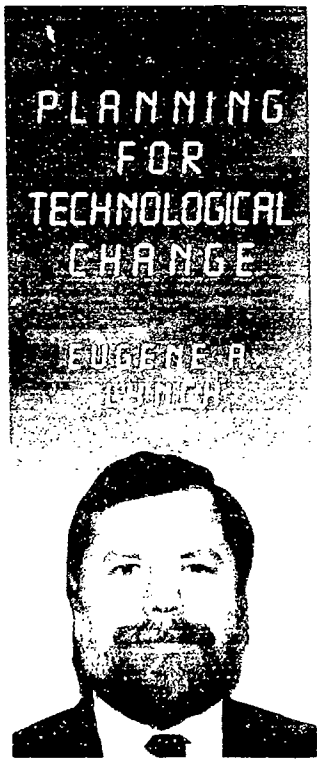


COMPARE THE TECHNOLOGY AVAILABLE IN THE AVERAGE CONNECTICUT CLASSROOM WITH THAT IN MANY CONNECTICUT HOMES.

How many classrooms have regular access to a television, computer, VCR, telephone, or calculator? In most homes, even in many children's bedrooms, these devices are common place. The recently published CEA report, *Our Children's Schools: Are They Good Enough?*, confirmed the lack of technology in most Connecticut schools and classrooms.

Educators almost universally accept the importance of technological literacy. We understand that to survive and compete in a global economy, we must develop a highly competent workforce that understands and utilizes technology. Similarly, in this age of information, all citizens must be adept users of information technology, able to navigate through the myriad online library catalogs, CD-ROM indexes, and laser and video disk systems now commonplace in many academic, public, and school libraries. Hardly a day goes by without the announcement of yet another merger of telephone, cable, and media companies jockeying for position to capture the lucrative home information/entertainment market.

But how has the educational environment responded to this burgeoning array of technological innovation? Until very recently most classrooms appeared much the way they have for, well, centuries. A colleague recently put this in perspective for me with an analogy. If a physician from the 18th century came back to life in a modern operating room, one can imagine that physician's shock at seeing the available technology. However, if a teacher from the same period came back to life in a typical classroom today, with its straight rows of desks facing the blackboard in front of the room, that teacher, unlike the doctor, would probably experience no shock at all.

Fortunately, there is cause for hope. In many classrooms, the straight rows of desks facing the lectern are gone. In their place are learning stations, a wide range of resource-based interdisciplinary activities, students working in small groups and on individual projects, and a de-emphasis on text-driven curricula. More and more teachers view themselves less as a "sage on the stage" and more as a facilitator of active student learning.

As both the content and context of instruction evolves, so does the role of technology. Where there may have been one lone Apple II computer per classroom (which was used occasionally for enrichment purposes), now there are networked schools with multiple computers and related technologies, not just in an isolated computer lab but in each classroom and media center. Computers and related technology, in such an environment, are used as an integral means to support the instructional process and empower students to explore and create. While only a small number of Connecticut schools can claim such technology today, most are planning to make the transition in the near future.

The Groton Public School system is one such district in the midst of this transition. Since 40% of its students come from military families connected to the U.S. Submarine Base, there is a keen awareness of global and closer-to-home changes needed in a regional defense-oriented economy. Both the Groton Board of Education and the local municipal governing body have endorsed a six-year initiative to upgrade student access to instructional technology. Over $2.25 million dollars have been earmarked for hardware and cabling alone, not to mention funds for software and staff development.

The plan is being developed and coordinated by a community-wide study group of over 30 parents, teachers, administrators, business and governmental representatives, and technical consultants (mostly pro bono from local industry) The goal is to wire each building (for data, video, and audio), so all classrooms are connected within the building and to the outside world through a wide-area network.

Students at the secondary schools (three middle and one high school) currently have access to the online Dow Jones News Service through a computer lab or media center. After each classroom is networked, students will be able to access such services and more (via the Internet) from within each classroom. Library media collections in most Groton schools are currently automated, but a wired school would enable access from all classrooms and between buildings as well. One elementary school is piloting on-line communication at the fourth and fifth grade levels by participating in the AT&T Learning Circles program. This can be expanded to all schools when additional hardware and networking become available through the technology-improvement initiative.

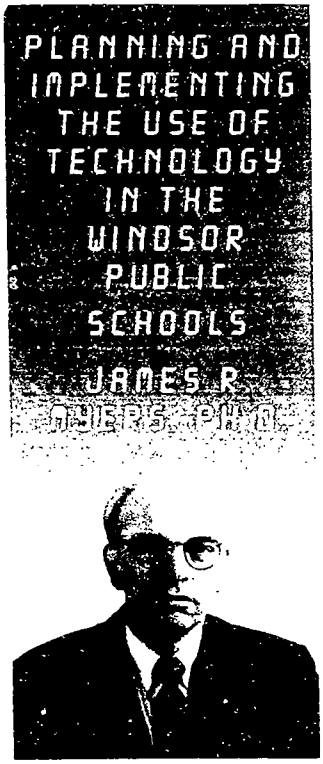
Expanding the walls of the classroom by giving access to building, district, regional, statewide, and global resources is essential in order to improve the information arsenal available to every student. At the same time, the isolation felt by many teachers in their own classrooms will be eliminated when they have the ability to communicate electronically with colleagues in other buildings, districts, or around the country. Access to multiple (between three to five) computers within each classroom will enable students to utilize technology on a regular basis to accomplish tasks in each discipline.

While the middle schools are leaning towards Macintosh technology and the high school is primarily a DOS Novell 1 environment, the elementary schools are piloting both systems during 1993-1994 before making a district-wide decision for the elementary level. However, as the former distinctions between the Macintosh and DOS environments have been minimized with the introduction of Windows and the ability to cross platforms in a networked environment, the debate over which system to choose becomes less significant.

While the technical details of any instructional technology initiative are certainly important, an emphasis should be placed on other elements of the plan: the specific role of technology to enhance the instructional process, the desired student outcomes, the instructional software, and other media which will be used to support the curriculum, and the training teachers need to utilize technology effectively.

The Groton Public Schools are on the brink of a technological revolution that will dramatically alter the manner in which students and teachers work and learn. The broad-based support of community decision makers—local board of education, teachers, administrators, parents, and students themselves—will help to ensure that this change is meaningful and lasting.

Eugene A. Lynch is the Director of Library-Media Services and Instructional Technology for the Groton Public Schools. A 19-year veteran teacher, Lynch earned his B.A. from Catholic University in Washington, DC, his M.Ed. from the University of Maryland, and his M.L.S. from the University of Rhode Island.



TRADITIONALLY, AS STUDENTS MADE THEIR WAY TO THE NEIGHBORHOOD BUS STOP TO START ANOTHER SCHOOL DAY, THEY CARTED STACKS OF BOOKS, KNAPSACKS AND SCHOOL LUNCHES, AND TALKED ABOUT THE DAY'S EVENTS.

Today, however, students more frequently carry laptop computers, exchange CD ROMs and floppy disks, and talk about using their new classroom computers.

Students who once swapped baseball cards are today swapping technology applications and computer simulations. This is the world in which teachers of the 21st century will be teaching. It is a world for which Windsor teachers will be prepared, because of the preparation which has gone into the development of a district technology plan.

The driving force behind the use of technology in the Windsor Public Schools is a K-12 Plan for Educational Technology. This plan sets forth an overall vision, major goals, and stated objectives. It provides direction and a framework for all planning and proposals related to the use of technology in our schools. Specific applications of technology are selected because they match the goals and objectives of our comprehensive plan.

We envision technology as an essential component in the teaching and learning process. It will allow us to meet curriculum goals more effectively. Ultimately, it will even let us achieve new objectives by changing the way we solve problems and accomplish tasks. Perhaps the most important central concept of our plan is that *we view technology not as a separate curriculum but rather as a range of capabilities which are integrated within all subject areas*. Students and staff will actually use technology to achieve curriculum objectives. Specifically, the objectives are:

- ❑ to use productivity tools such as word processing, database, spreadsheet, and draw/print programs across the curriculum;
- ❑ to use technology to access information for curriculum purposes;
- ❑ to use interactive technologies to achieve curriculum goals; and
- ❑ to use technology to communicate information and ideas through the creation of products and presentations.

We have also planned specific activities to accomplish these objectives. Let me cite just several in which teachers can become involved, thus helping the school district to meet the needs of its students in the use of technology.

- ❑ During the 92-93 school year, one seventh-grade team developed an interdisciplinary unit called "The Seven Wonders of the World." The unit required the use of word processing as a writing tool, database as a way of organizing information, and graphics tools to actually produce drawings related to the project. The science, English, math, social studies, and art teachers were all involved in the design of this unit, which went on to win a Connecticut "Educating for High Performance" Award.
- ❑ Technology as a tool for accessing information is an integral part of our library media programs. Resources available on CD-ROM have been very important here. All centers have electronic encyclopedias and other reference sources in this format. For example, the Windsor High School Library Resource Center has InfoTrak for locating magazine articles and Newsbank for accessing information available in the Newsbank microfiche collection. Technology has changed the research process in several important ways. It provides more information and delivers some of it in a multimedia format. It also allows us to search more precisely than ever through the electronic linking of key words and phrases.

- Interactive technologies have also begun to be used at all levels. Examples include the recent use of a science videodisk program in the early grades which allows teachers to select still and moving visuals of many topics in our science curriculum. At the middle school, we have just acquired the videodisk program Jasper, which involves middle-school students in mathematical problem-solving. And at the high school, we are continuing to use several videodisks containing entire collections of famous art museums.

- One of the most exciting projects under way within the Windsor Public Schools involves interactive technologies. The new concept of the student as a "Time Traveler" moving through computer-generated time tunnels to explore, for example, comparative literature, the randomization of learning concepts, and non-linear learning, may offer a whole new venue for constructing curricula. The teacher enters the world of computer-simulated virtual reality along with the student.

In summary, the teachers in the Windsor Public Schools have reached out to use the new resources available in computer technology as a way of adding both creativity and a multi-dimensional aspect to the problem-solving techniques used in their instruction. It also offers a means of most effectively using resources which must now be shared by larger and larger groups of students because of down-sizing and reconfiguration of school organizations. The schools of Windsor continue to aspire to be instructional lighthouses. Today, however, in order to chart a new course, we are attempting to probe the limits of the educational horizon — not with a torch but with laser light.

Dr. James R. Myers is superintendent of the Windsor Public School District. He is a 24-year veteran in public education. Myers received his B.A. From Asbury College in Wilmore, Kentucky, and his M.Ed. and Ph.D. from The American University in Washington, D.C. Dr. Myers has done postdoctoral work at the Colgate Darden Graduate School of Business Administration at the University of Virginia, and the Harvard Graduate School of Education.

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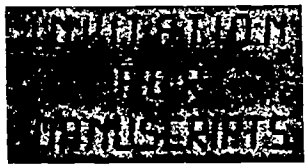
NOTES

CONNECTICUT EDUCATION ASSOCIATION

The Connecticut Education Association (CEA), an affiliate of the National Education Association (NEA), is an organization of 28,500 classroom teachers. CEA is an advocate for teachers' interests at the local, state, and national levels of government. Governed by an elected 28-member board of directors, CEA employs a 69-member staff. CEA maintains a central headquarters in Hartford and nine regional field offices throughout the state.

CEA works to advance the cause of free public schools; promote the continuous improvement of education; recognize the importance of the teacher as the preeminent member of the profession; encourage professional excellence and growth among educators; advocate and protect the civil, human, and professional employment rights of its members; and insure members full and effective participation within the Association.



Topics to be addressed in this CEA ongoing series of occasional papers—*Professional Issues in Public Education*—shall be concerned with the integrity and general welfare of students, teachers, teaching, and public education.

CEA members interested in being considered for writing an occasional paper are invited to submit an abstract of the proposed article to:

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